

DERWENT-ACC-NO: 2003-157625

DERWENT-WEEK: 200506

COPYRIGHT 2007 DERWENT INFORMATION LTD

TITLE: System for increasing the power output in an engine or pump, also exploits buoyancy arising from a component of a lighter material submerged in a liquid to produce energy

INVENTOR: RANTALA, V K

PATENT-ASSIGNEE: RANTALA V K[RANTI]

PRIORITY-DATA: 2001FI-0001591 (July 31, 2001)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
CN 1535349 A	October 6, 2004	N/A	000	F01C 001/46
WO 2003012259 A1	February 13, 2003	E	007	F01C 001/46
FI 200101591 A	February 1, 2003	N/A	000	F01C 000/00
FI 112107 B1	October 31, 2003	N/A	000	F01C 009/00
EP 1423585 A1	June 2, 2004	E	000	F01C 001/46
KR 2004018533 A	March 3, 2004	N/A	000	F01C 001/46
AU 2002355781 A1	February 17, 2003	N/A	000	F01C 001/46
US 20040219049 A1	November 4, 2004	N/A	000	F01C 001/00
JP 2004537671 W	December 16, 2004	N/A	019	F01C 001/46

DESIGNATED-STATES: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ

DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI

SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW AT BE BG CH CY CZ DE DK EA

EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ

UG ZM ZW AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
CN 1535349A	N/A	2002CN-0814871	July 25, 2002
WO2003012259A1	N/A	2002WO-FI00646	July 25, 2002
FI 200101591A	N/A	2001FI-0001591	July 31, 2001
FI 112107B1	N/A	2001FI-0001591	July 31, 2001

FI 112107B1	Previous Publ.	FI 200101591	N/A
EP 1423585A1	N/A	2002EP-0751233	July 25, 2002
EP 1423585A1	N/A	2002WO-FI00646	July 25, 2002
EP 1423585A1	Based on	WO2003012259	N/A
KR2004018533A	N/A	2004KR-0701355	January 30, 2004
AU2002355781A1	N/A	2002AU-0355781	July 25, 2002
AU2002355781A1	Based on	WO2003012259	N/A
US20040219049A1	N/A	2002WO-FI00646	July 25, 2002
US20040219049A1	N/A	2004US-0485361	March 22, 2004
JP2004537671W	N/A	2002WO-FI00646	July 25, 2002
JP2004537671W	N/A	2003JP-0517420	July 25, 2002
JP2004537671W	Based on	WO2003012259	N/A

INT-CL (IPC): F01C000/00, F01C001/00 , F01C001/46 , F01C009/00 ,  
F03C002/00 , F04C002/00

ABSTRACTED-PUB-NO: WO2003012259A

#### BASIC-ABSTRACT:

**NOVELTY** - The device is acted on by a pressurised medium during its operating cycle, at least to the lower dead centre of the rotating piston and afterwards the device is acted on by the buoyancy arising from the rotating piston essentially at least to its upper dead centre.

**DETAILED DESCRIPTION** - The device includes a cylinder (4), inside which is a lever piston (7) pivoted (8) to make a reciprocating motion and a rotating piston (6) mounted eccentrically in a bearing (1) to make a rotating motion, and which is hollow or manufactured from a material lighter than the pressurised medium used in the device, as well as an inlet opening (3) opening in the work chamber (9) of the cylinder.

**USE** - For increasing the power output in an engine, pump or similar device, using the energy of waves or tides.

**ADVANTAGE** - Utilises buoyancy and pressure of a medium to produce energy.

**DESCRIPTION OF DRAWING(S)** - The drawing shows the lever piston in the work stage operating under pressure.

bearing 1

inlet opening 3

cylinder 4

rotating piston 6

lever piston 7

pivoting 8

work chamber 9

CHOSEN-DRAWING: Dwg.1/4

TITLE-TERMS: SYSTEM INCREASE POWER OUTPUT ENGINE PUMP EXPLOIT  
BUOYANCY ARISE  
COMPONENT LIGHT MATERIAL SUBMERGED LIQUID PRODUCE ENERGY

DERWENT-CLASS: Q51 Q55 Q56

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: N2003-124445

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
13 February 2003 (13.02.2003)

PCT

(10) International Publication Number  
**WO 03/012259 A1**

(51) International Patent Classification<sup>7</sup>: **F01C 1/46**

(21) International Application Number: **PCT/FI02/00646**

(22) International Filing Date: **25 July 2002 (25.07.2002)**

(25) Filing Language: **Finnish**

(26) Publication Language: **English**

(30) Priority Data:  
**20011591 31 July 2001 (31.07.2001) FI**

(71) Applicant and

(72) Inventor: **RANTALA, Veikko, Kalevi [FI/FT];** Suvipel-  
lontie 20, FIN-49290 Vastila (FI).

(74) Agent: **LAITINEN, Pauli, S.;** Patentti-Laitinen OY, P.O.  
Box 29, FIN-02771 Espoo (FI).

(81) Designated States (national): **AE, AG, AL, AM, AT, AU,**  
**AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,**

**CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,**  
**GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,**  
**LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,**  
**MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,**  
**SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,**  
**VN, YU, ZA, ZM, ZW.**

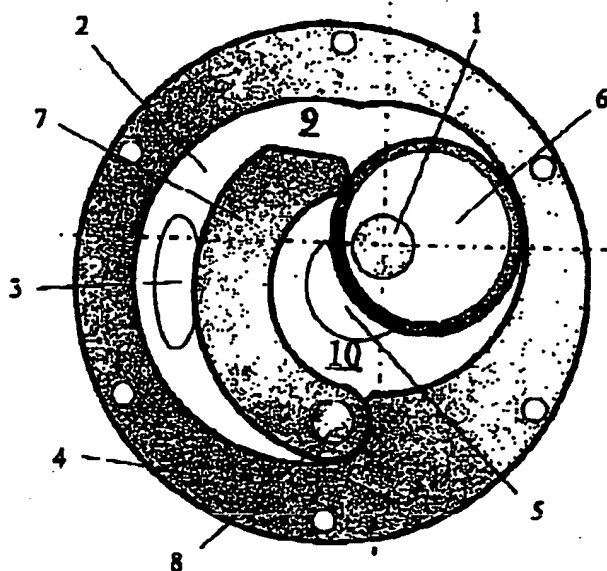
(84) Designated States (regional): **ARIPO patent (GH, GM,**  
**KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),**  
**Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),**  
**European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,**  
**ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK,**  
**TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,**  
**GW, ML, MR, NE, SN, TD, TG).**

Published:

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **METHOD FOR INCREASING THE EFFECT TO BE PRODUCED IN A MOTOR, PUMP OR THE LIKE**



(57) Abstract: The invention relates to a method for increasing the power output in an engine, pump, or similar device, which includes a cylinder(4), inside which is a lever piston (7) pivoted (8) to make a reciprocating motion and a rotating piston (6) mounted eccentrically in a bearing (1) to make a rotating motion, as well as an inlet opening (3) opening into the work chamber (9) of the cylinder and an exhaust opening (5) leading out of the exhaust chamber (10) of the cylinder. At least the rotating piston (5) is hollow or manufactured from a material lighter than the pressurized medium used in the device. The lever piston (7) too can be hollow or manufactured from a material lighter than the medium used.

WO 03/012259 A1

Method for increasing the effect to be produced in a motor, pump or the like.

The present invention relates to a method for increasing the power output in an engine, pump, or similar device, which is of the type defined in the preamble of Claim 1. The invention particularly relates to a device, which exploits buoyancy, in addition to its other properties.

Buoyancy is based on the well-known fact that when an object is submerged in a liquid it loses a part of its weight equal to the amount of liquid displaced. Attempts have been made to utilize buoyancy, for example, by using various devices based on pontoons, by exploiting the energy of waves or tides.

These inventions have had the drawbacks of low efficiency, large size, a complex mechanism, and the unsuitability of the devices for many purposes and, among other things, for utilizing gravity.

The invention is intended to eliminate these defects and create a device that utilizes buoyancy and the pressure of a medium.

According to the invention, this purpose can be achieved, if, for example, substantial alterations, which permit buoyancy to be utilized, are made to a device according to PCT/FI00/00034.

In general, an engine or similar according to the invention, like one applying the basic principles according to the aforesaid international application, is formed of a cylinder, which is manufactured from any material used for this purpose. The cylinder can have a generally flat shape seen along the plane of the paper in the figures. It can be assembled from two or more components forming layers, which are suitably attached to each other, for example, in the same way as the cylinder head is attached to the cylinder block in an internal combustion engine.

Other components in the solution used in the method according to the invention

are naturally gaskets, various pipes connected to the inlet and exhaust ducts, valves, heaters for the medium, etc., as well as means used to handle the output of power from the engine.

The device for use according to the invention includes two cylinder bores for the work chambers. Shafts run through these work chambers run at right angles to the paper in the figures and are mounted in bearings, for example, so that the ends of the shafts above the paper are set in bearings in the 'head' of the engine while the ends of the shafts below the level of the paper go through the 'base' of the engine, where they are set in bearings. A rotating piston, which is eccentric, is mounted in bearings on one of the shafts. A lever device, a lever piston, is, in turn, mounted in bearings on the other shaft.

The internal construction of the engine or similar is as follows. The shafts run through the bores of the work chambers of the cylinder. The rotating piston is attached eccentrically to one shaft and the lever piston to the other, for example, as described above, but in any case eccentrically close to its outer edge, as the figures clearly show. Ample eccentricity is, in this case, an advantage, because it is precisely with its aid that power is obtained in the lever-piston engine.

The lever piston and the corresponding bore, which forms the second work chamber, is clearly larger than the rotating piston, which is essentially a cylindrical piece with a circular cross-section. The outer edge of the lever piston is particularly shaped as a segment of the circumference of a circle. Closer to the farthest end from the shaft, there is a machined recess, which is nearly the size of half of the rotating piston 5, as shown in the figure. In each revolution, the rotating piston rotates into the recess in the lever piston, at which stage the exhaust chamber has nearly entirely vanished and exhausted into the outlet duct.

The outlet duct can be lead, for example, to the inlet valve of a second lever-piston engine, which can also be a simple inlet duct without valves, so that there

is no limit to the number of engine units that can be connected together in solutions according to the invention. The engine units can be connected to each other and simultaneously connected using the rotating piston shafts of each unit, in the same position, or at a desired angle to each other.

According to the invention, it has now been realized that, in the type of solution in question, the buoyancy arising from a component of a lighter material submerged in a liquid can also be exploited to produce energy.

The intention of the invention can also be realized with other corresponding devices that utilise pressure or gravity.

More specifically, the method according to the invention for utilizing buoyancy is characterized by what is stated in the characterizing portion of Claim 1.

Thus, the rotating piston is manufactured to be hollow or from a material that is lighter than the medium. The device is turned in its entirety, for example, about 90 degrees clockwise, so that when the pressure effect of the medium ends, the rotating piston is at its lower dead centre while in the rest and exhaust stages of the device the buoyancy rotates the rotating piston again to its upper dead centre, where the pressure effect of the medium starts again.

The lever piston acts as a valve in the inlet opening and the rotating piston as a valve in the exhaust opening.

Another possibility is to manufacture the lever piston to be entirely or partly hollow, or of a material that is lighter than the medium and to turn the device to the best position in terms of the buoyancy.

In the following, the invention is examined in greater detail with reference to the accompanying drawings, which are cross-sections showing the operating principle according to the invention and the general construction of the device. A description of the operation of the device according to the invention is provided

by going through a complete revolution, from stage to stage according to Figures 1 - 4, proceeding in their numerical order.

#### Figure 1

The lever-piston device is in the work stage operating under pressure, when, inside the cylinder 4, the medium under pressure flows in from the inlet opening 3 to act on the lever piston 7 and the rotating piston 6. The medium that has created pressure during the previous work stage exhausts from the exhaust chamber 10 at a lower pressure, because the outlet opening 5 is open and has reduced the pressure of the medium to discharge. Because the pressure in the work chamber 9 is greater than in the exhaust chamber 10, the pistons 6 and 7 rotate and rotate the shaft 1 clockwise.

#### Figure 2

The work stage created by the pressure of the medium of the lever-piston device has ended and the pressure is now equal in both the work chamber 9 and the exhaust chamber 10. The rotating piston 6 is both hollow and eccentric and when it has passed its lower dead centre, buoyancy begins to turn both the rotating piston 6 and the shaft 1 clockwise. The inlet opening for the medium 3 in the head 2 is still open, but, as the pressure surrounding the pistons 6 and 7 and the volume of the cylinder 4 remain unchanged, the buoyancy acting of the rotating piston 6 can turn the shaft 1 clockwise unobstructedly. Due to the buoyancy, the work stage in the device continues until the next work stage created by the pressure in Figure 4.

#### Figure 3

Due to buoyancy, the rotating piston 6 has turned and simultaneously turned the lever piston 7 into a position in which the inlet opening 3 has closed and simultaneously the exhaust opening 5 opened, while the pressure of the work chamber 10 discharges through the exhaust opening 5. The medium does not,



however leave the cylinder 4, because the inlet opening 3 is closed and the buoyancy continues to rotate the lever piston 6 and the shaft 1 clockwise.

#### Figure 4

Due to buoyancy, the rotating piston 6 has turned and simultaneously turned the lever piston 7 into a position, in which the medium inlet opening 3 is beginning to open and, because the rotating piston 6 closes the connection between the work chamber 9 and the exhaust chamber 10, the pressure increases in the work chamber, thus starting a new work stage created by the pressure of the medium as the effect of the buoyancy is ending.

The work stages operating by the pressure of the medium and by buoyancy are partly simultaneous at the upper and lower dead centres of the rotating piston and alternate in such a way that there is always a work stage operating in the device.

It is obvious, that the lighter the rotating piston 6 is, the greater is the addition to the efficiency of the operation of the device according to the invention. However, many variations relating to the lightness/hollowness are possible. As previously stated, the invention can also be utilized in connection with other devices of a similar type.

Claims:

1. A method for increasing the power output in an engine, pump, or similar device, which includes a cylinder (4), inside which is a lever piston (7) pivoted (8) to make a reciprocating motion and a rotating piston (6) mounted eccentrically in a bearing (1) to make a rotating motion, and which is hollow or manufactured from a material lighter than the pressurized medium used in the device, as well as an inlet opening (3) opening in the work chamber (9) of the cylinder and an exhaust opening (5) leading out of the exhaust chamber (10) of the cylinder, **characterized** in that the device is acted on by a pressurized medium during its operating cycle, at least to the lower dead centre of the rotating piston (6) and that afterwards the device is acted on by the buoyancy arising from the rotating piston essentially at least to its upper dead centre.
2. A method according to Claim 1, **characterized** in that the lever piston (7) is also made hollow, or that it is manufactured from a material that is lighter than the medium used.
3. A method according to Claim 1, **characterized** in that the device is constructed to operate in such a way that the work stages operating by the pressure of the medium and by buoyancy are partly simultaneous in the vicinities of the upper and lower dead centres of the rotating piston (6) and alternate in such a way that a work stage is always taking place in the device.
4. A method according to Claim 1, **characterized** in that the invariableness of the pressure surrounding the pistons (6) and (7) and of the volume of the cylinder (4) are ensured during the work stage created by the buoyancy, in such a way that the buoyancy acting on the rotating piston (6) can, without obstruction, turn the shaft (1).
5. A method according to Claim 1, **characterized** in that the inlet opening (3) of the medium and the exhaust opening (5) of the medium are equipped with an area in which the lever piston (7) and correspondingly the rotating piston (5)

perform their opening/closing.

6. A method according to Claim 1, **characterized** in that the effective surface area of the device and the volume of the rotating piston (6) are made large in relation to the volume of the medium used.

7. A method according to Claim 1, **characterized** in that the dimensions of the device are varied for different applications.

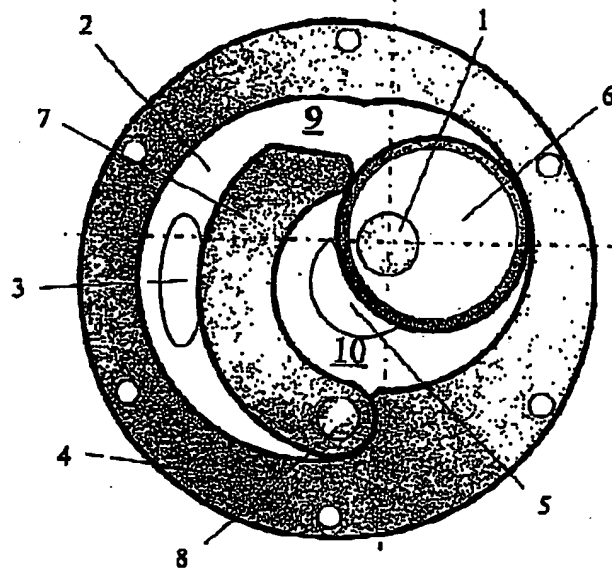


Fig 1

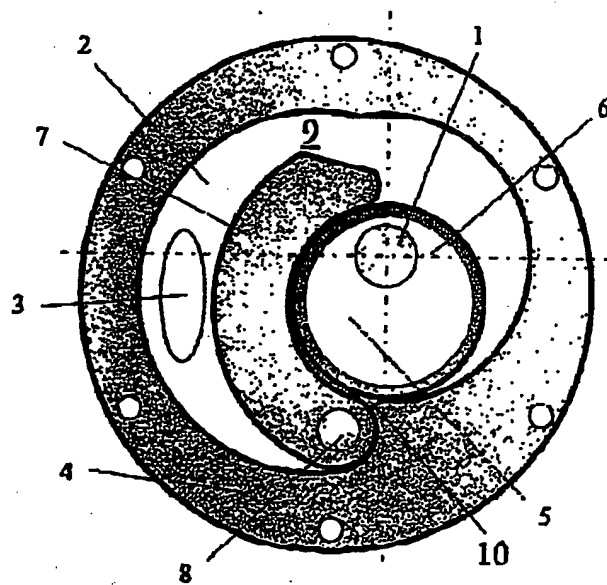


Fig 2

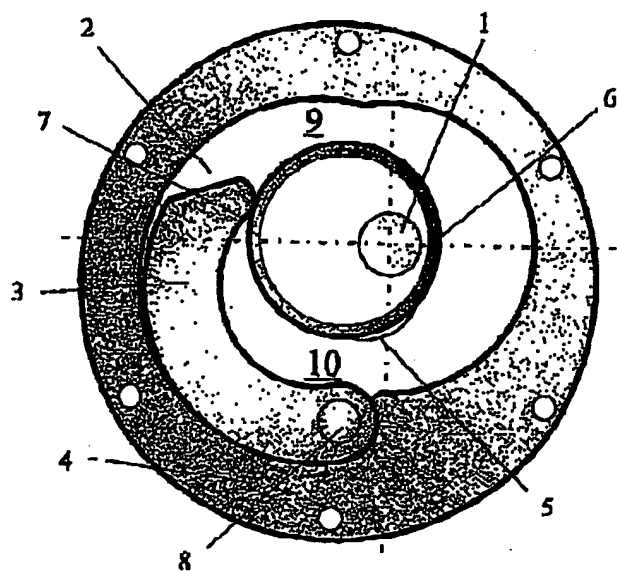


Fig 3

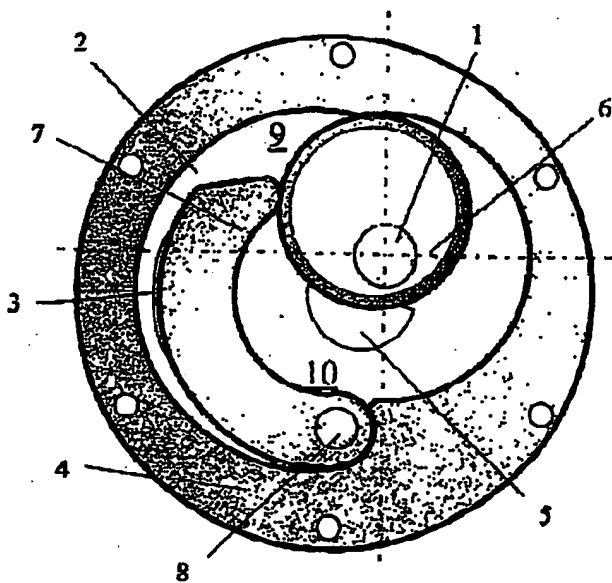


Fig 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00646

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F01C 1/46

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F01C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 275302 A (HORACE ARTHUR COSTERTON), 29 July 1927 (29.07.27), figure 2	1,3-7
Y		2
X	WO 0045032 A1 (VALDE, IRIS, KYLLIKKI), 3 August 2000 (03.08.00), figures 1-8	1,3-7
Y		2
X	US 3707073 A (BERNSTEIN), 26 December 1972 (26.12.72), figures 1-4	1,3-7
Y		2

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

4 November 2002

03-11-2002

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Lena Nilsson / JA A  
Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00646

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3081707 A (J.W. MARSHALL), 19 March 1963 (19.03.63), figure 1	1,3-7
Y	--	2
X	US 4214557 A (BEACH, JR), 29 July 1980 (29.07.80), figures 1-5	1,3-7
Y	--	2
X	US 4423710 A (WILLIAMS), 3 January 1984 (03.01.84), column 5, line 26 - line 31, figure 1	1,3-7
Y	--	2
X	US 4487167 A (WILLIAMS), 11 December 1984 (11.12.84), figure 1	1,3-7
Y	--	2
X	US 4658779 A (DEL GRANDO), 21 April 1987 (21.04.87), figures 4A-4F	1-7
Y	--	2

## INTERNATIONAL SEARCH REPORT

Information on patent family members

30/09/02

International application No.

PCT/FI 02/00646

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
GB	275302	A	29/07/77	NONE		
WO	0045032	A1	03/08/00	AU	2296300 A	18/08/00
				CN	1336979 T	20/02/02
				EP	1147292 A	24/10/01
				FI	3970 U	19/05/99
				FI	990083 A,V	19/07/00
				NO	20013511 A	16/07/01
US	3707073	A	26/12/72	DE	2141895 A,B,C	09/03/72
				FR	2112935 A	23/06/72
				GB	1354170 A	05/06/74
				IT	940899 B	20/02/73
				JP	52031483 B	15/08/77
				SE	371859 B	02/12/74
US	3081707	A	19/03/63	NONE		
US	4214557	A	29/07/80	NONE		
US	4423710	A	03/01/84	NONE		
US	4487167	A	11/12/84	NONE		
US	4658779	A	21/04/87	NONE		